**6th Grade Science Energy Lessons**

**Lesson 1 – Kinetic and Potential Energy**

* **Science - SPI 0607.10.2** Interpret the relationship between potential and kinetic energy.
* **Science - SPI 0607.Inq.3** Interpret and translate data in a table, graph, or diagram.
* **Science - SPI 0607.Inq.1** Design a simple experimental procedure with an identified control and appropriate variables.
* **Science - SPI 0607.Inq.4** Draw a conclusion that establishes a cause and effect

**Materials:** Several types of balls that bounce well (tennis, ping-pong, golf), graph paper, handouts

**Time needed:** 1 hour

* + **Exploration of Pre-Instruction Understanding**
* Brainstorm the meaning of energy, potential energy and kinetic energy
  + - * Verbalize the ideas of kinetic and potential by tossing a ball around to students
      * Have students use the backs of their worksheets to write their ideas about energy, including kinetic and potential energy. Come to a consensus as a class as to the meaning of potential and kinetic energy and good examples of each.
      * Ask students “Are potential and kinetic energy related?” “How?” Discuss. Now ask them “How can we know they are related?” Test it, of course!
  + **Pre-Laboratory Activities**
    - Divide students into groups of 3-4 people.
    - Use the worksheet to prepare for the lab
      * Materials: ball, meter stick
      * Safety: sports balls, meter sticks, worksheets
      * Hypothesis
      * “If the ball is held at \_\_\_\_\_\_\_\_cm high, it will bounce to \_\_\_\_\_\_\_\_\_ cm high”.
      * ***SPI 0607.Inq.1 Design a simple experimental procedure with an identified control and appropriate variables***.
      * Pick five different heights to test – some higher and some lower - that are at least 10cm apart.
      * The starting height of the ball and its bounce are the control (what all other bounces will be compared to).
      * The independent variable is the starting height and the height of the bounce is the dependent variable.
      * Provide an example of what the data table should look like



* + **Participation in the Laboratory Activity**
    - Students begin the experiment recording their observations, data, and finally making their line graph (Independent variable on x-axis - beginning height of ball- and dependent variable on y-axis – height of bounce).
    - Each trial needs to be re-tested multiple times.
    - Monitor the process of carrying out the experiment and the recording of data.
    - Students write their observations along with their data in their worksheets.
    - After collecting data and writing their observations, students graph their data. ***SPI 0607.Inq.3 Interpret and translate data in a table, graph, or diagram***
  + **Completing the analysis**
    - On the worksheet, students’ need to fill in the conclusion statement: “I can claim that the greater the potential energy, the \_\_\_\_\_\_\_\_ the kinetic energy because when the ball is dropped from a higher height,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The less the potential energy, the \_\_\_\_\_\_\_ the kinetic energy because when the ball is dropped from a lower height,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.” ***SPI 0607.10.2 Interpret the relationship between potential and kinetic energy.***
  + **Optional: share data**
    - Next, students compare their findings with the other groups by writing their statements on the board , on group white boards, or on butcher paper
    - Group discussion of results
  + **Negotiation Phase IV- Individual Reflection** 
    - At the bottom of the worksheet, students will free write what they have learned regarding energy and how their ideas have changed during the investigation.
  + **Extension**
    - Other assessments may include a quiz over potential and kinetic energy that includes how students know what they know or have students make a prediction based on their data how high their ball would need to be held in order to bounce as high as a basketball goal. ***SPI 0606.1.1 Make conjectures and predictions based on data.***